

Mint of the United States at Philadelphia

SMELTING AND REFINING DEPARTMENT

Philadelphia, 27th December

Sir

In accordance with your letter of the 1st instant, I have examined, both by inquiry and experiment, the results obtained in my Department of the Mint, by the use of the electric light, compared with that of gas, and have formed thereon the following opinions.

Finding that the electric light was obtained by the use of two kinds of light centres, whose resultant effects were quite different, I gave a separate consideration to each of these before comparing them with city gas.

Believe that these two electric lights may be said to embrace, with some modifications, all the varieties of electric lights now employed. One of these lights is produced by the current passing between

charcoal at points and may be termed the arc-light; the other by the current maintaining a thin piece of charcoal in the shape of M or W, incandescent.

I pass over the disagreeable fluctuation or waving of the arc-light, undoubtably injurious to the eye, even without looking directly at the light-center, offering and believing that it can be remedied. I also pass over the greater danger of fire from the arc-light, reduced to a minimum in the incandescent light, considering that the danger may be avoided. I should also state that when I saw and experimented with the two lights, I believe that the arc-light was at its intensity, while the other was at about half the incandescence it had first shown, before some of the power of the engine was drawn off to work the over-light. This did not however affect the resulting conclusions I formed.

The arc-light undoubtedly produces a disagreeable and rather painful impression on the eye.

when the light is directly, being blindingly white.
This effect is not due to the intensity of the light alone,
but in part to its whiteness, making it quite different
from the direct and dazzling, but not painful, rays
of the sun. Even the illumination of objects by the arc-
light produces to a limited extent of the same effect,
requiring a slight effort, especially at the first mo-
ment of observation, to see objects with a distinctness
similar to those sun illuminated. The incandescent
light, with its slight reddish or orange tint, is not
painful to look at directly, but merely dazzling, even
at great intensity, while the illumination of objects is quite
satisfactory to the eye. In their illuminating power, as
viewed direct, or when thrown on objects, the incandes-
cent light surpasses the arc-light.

In the defining power, which is not measured,
direct and alone, by intensity of light, the arc-light ap-
pears at first sight to surpass greatly the incandescent
light; but careful and repeated observation led me

to conclude that the appearance is deceptive, and that for near objects the latter exceeds the arc light in definition of outline and of other qualities.

The distinction I make is important, and may perhaps be better understood by comparison with lights already known to us. The full moon in a clear sky illumines the landscape with distinctness and beauty, but is sadly deficient in its power of defining objects, when closely examined. The disagreeable effects of moon light continuously looked at are proverbial, and its lack of warm coloring gives it the universal title, "the cold, pale moon." The best definition I can give of the arc-light is "intensified moonlight with a corresponding illuminating and defining power." In a similar manner the warmth of coloring, the satisfaction to the eye, and the clearness of definition, resulting from the light of incandescent carbon, in its limited sphere, shows a resemblance to sunlight, altho' of course in an enormously diminished degree.

I made a few experiments on the two electric lights compared with gas light, the latter being a fish-tail burner of 5 or 6 feet. I tested them all by reading the same point of a daily paper in different directions, and at varying distances. The same differences were observed between the two electric lights, as are set forth more fully above, the point being read with more ease and satisfaction by the incandescent light. It so happened that the gas light was nearly equal in illumination to that of the incandescent carbon, and was similar in kind to the arc light, the difference observed between them. I recall however what I stated at the beginning of this article that the incandescent light was produced with half (or much less) the power, that had been previously used.

For illuminating objects in general, or at some distance from it, the arc light appears to be equal to, if not superior to the other two, but for defining power, and agreeableness to the eye, I prefer the gas and the incandescent lights.

For illuminating rooms in the Mint, the arc-light
may be preferable, altho' I doubt it, and had not
the means of deciding the point absolutely, but for
seeing near objects quickly and distinctly, which I
think very important in most of our working rooms,
the other two, which are nearly alike, are superior to
the arc-light.

Very Respectfully
Jas C Booth

M & R

Hon. A. Loudon Snowden
Superintendent